At the End of the Pipe: Exploring the Issues & Impacts Associated With Manchester's Urban Ponds

Jen Drociak

Manchester Conservation Commission

Urban Ponds Restoration Program

1 City Hall Plaza

Manchester, NH 03101

(603) 647-1826

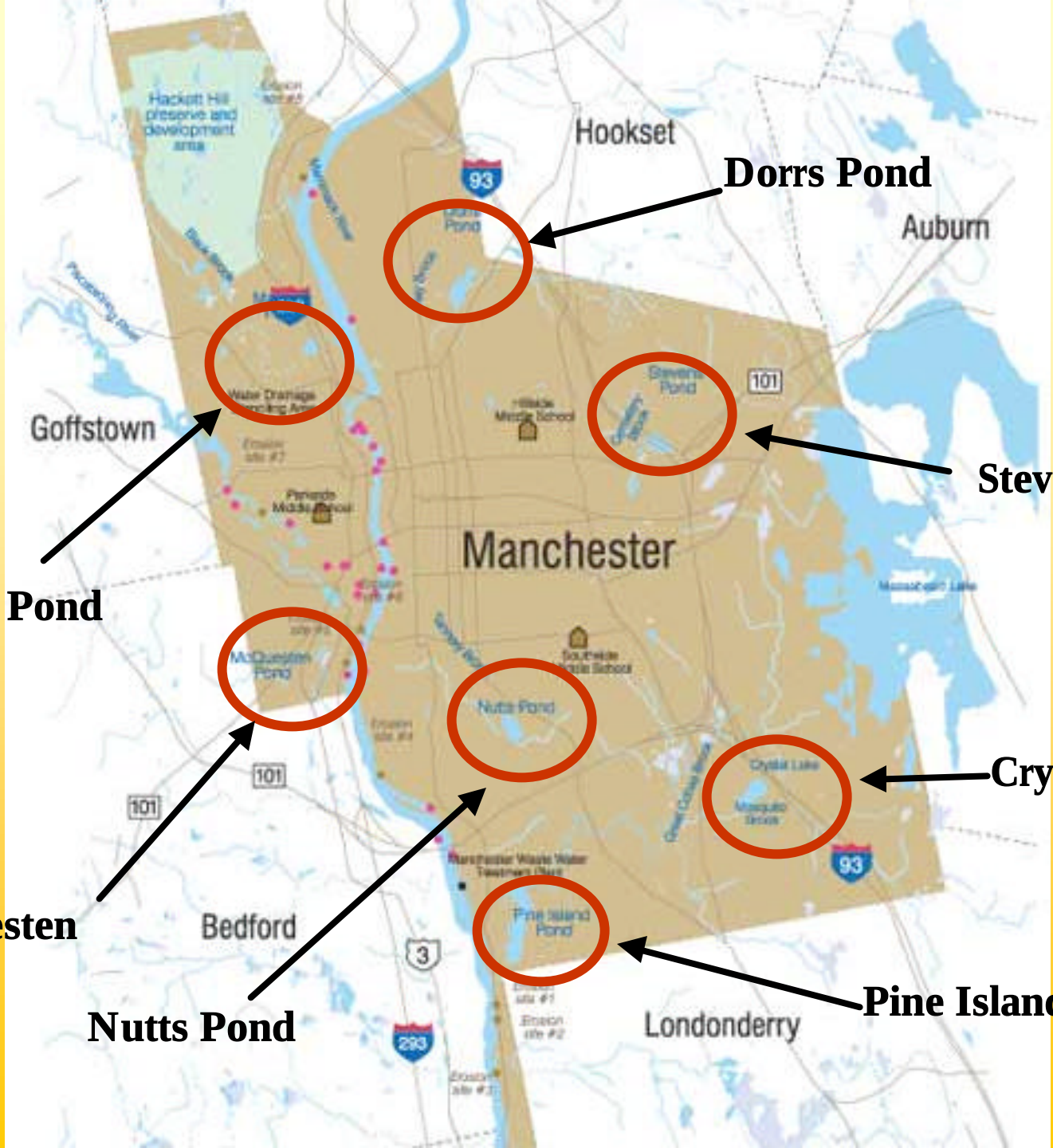
Urbanponds@yahoo.com

http://www.manchesternh.gov/UrbanPonds

Overview

1. Common Issues Facing Manchester's Ponds
2. Manchester Urban Pond Restoration Program
3. Pond Project Prioritization
4. Some Solutions
5. Outreach / Education Endeavors

Common Issues Facing Manchester's Ponds


Hookset
Dorrs Pond
Auburn
Goffstown
Stevens Pond
Manchester
Maxwell Pond
Crystal Lake
McQuesten Pond
Nutts Pond
Bedford
Pine Island Pond
Londonderry
93
101
3
293

Crystal Lake

Dorrs Pond

Maxwell Pond

McQuesten Pond

Nutts Pond

Pine Island Pond

Stevens Pond

Degraded Water Quality

- Nutrient Loading
- Increased Algal Blooms
- Decreased Dissolved Oxygen Levels
- Heavy Metals Loading
- High Bacteria Counts & Septic Systems

Stormwater & Sediment Runoff - Culverts

- Ray Brook (inlet to Dorrs Pond)
- Tannery Brook (inlet and outlet to Nutts Pond.
- Cemetery Brook (outlet from Stevens Pond

Flash storm surges cause decreased water quality from lack of tributary/wetland filtration

Stormwater & Sediment Runoff – Tributaries

Eroded Shorelines & Inadequate Vegetative Buffers

- **Intensely-maintained shorelines.**
- **Inadequate vegetation on shorelines.**
- **Armored banks.**

*** Erosion causes increased sediment, phosphorus, and nitrogen loading, smothers bottom habitat, creates sediment plumes, and decreases water clarity***

Lack of Recreational Opportunities & Degraded Trail Systems

- **Maxwell Pond:** **Old playground needing renovations. No official trail system. Unmaintained and degraded.**
- **McQuesten Pond:** **Only access is from behind commercial parking lots.**
- **Stevens Pond:** **Degraded and limited boat ramp/access. No maintained trails.**

Newly or soon-to-be renovated: Crystal Lake beach property, Dorrs Pond trail network/playground, Pine Island Park playground

Transient Residents

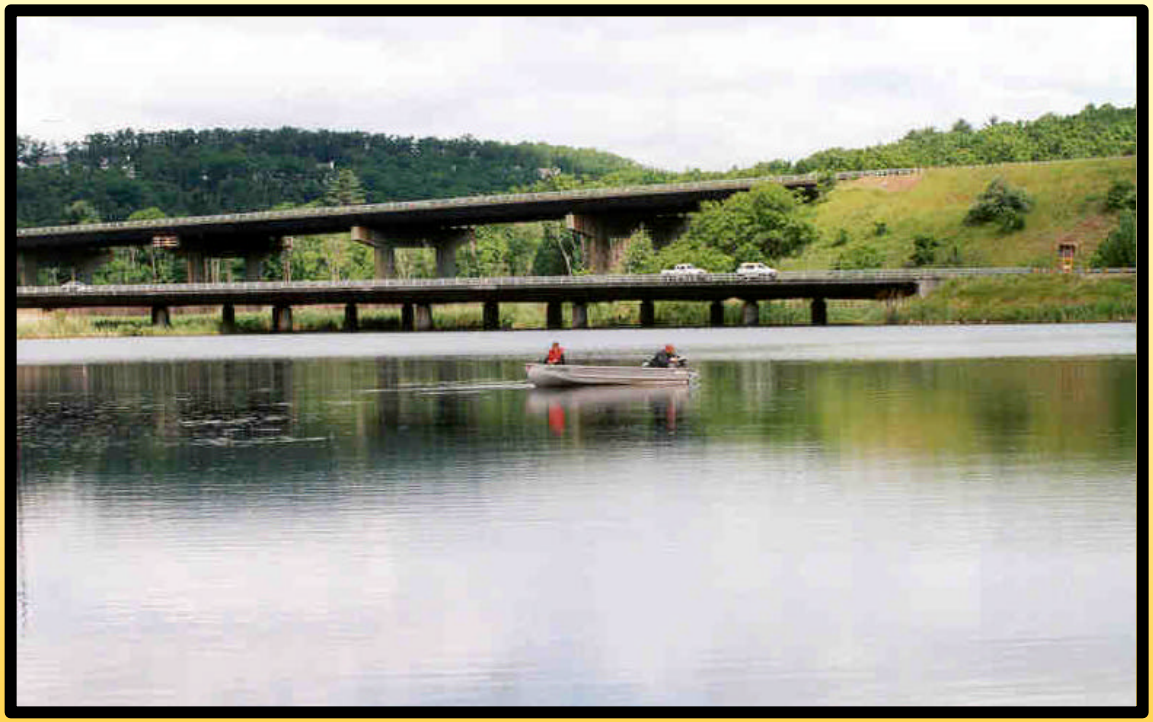
•**Difficult generating public support and participation at Maxwell Pond and Nutts Pond since most of the abutters are apartment-dwellers and do not live in the area long-term.**

Crystal Lake and Dorrs Pond, and Pine Island Pond are lived on by home and camp owners. Crystal Lake and Dorrs Pond both have active and successful pond preservation societies

Commercial Zones:
So. Willow Street & Second Street

I93 Highway Runoff

- **Stevens Pond:** **Receives untreated runoff from interstate 93.**
- **The pond has some of the highest chloride and sodium levels for a freshwater body in the state of NH!**



Don’t forget the sand, oil, grit and other vehicular “drippings” that find themselves in the water!

Dumpsters, Trash, Illegal Dumping

Twice-yearly pond cleanups are STILL not enough!

Graffiti

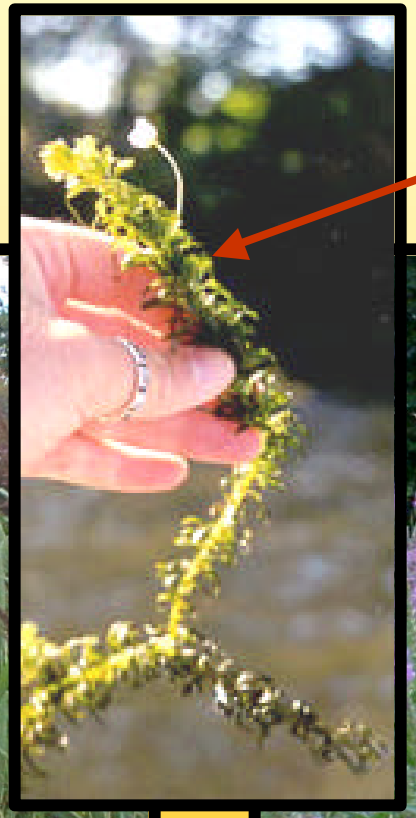
Invasive Plant Species: Terrestrial

Autumn Olive

Japanese Knotweed

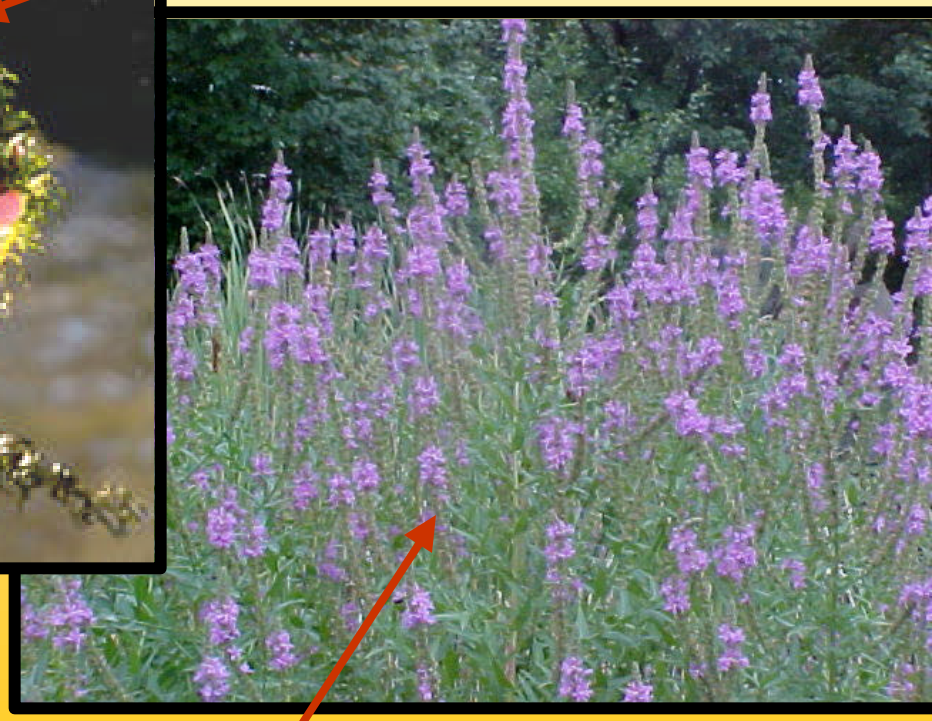
European Buckthorn

Invasive Plant Species: Aquatic



Brazilian elodea

Common Reed
(Phragmites)



Purple Loosestrife

Purple Loosestrife – An Ambitious Invader!

2. Manchester Urban Ponds Restoration Program

“Improving the health of Manchester’s ponds with the power of partnership and the spirit of community”

What Is The Manchester Urban Ponds Restoration Program?

Part of the Supplemental Environmental Projects Plan (SEPP) which is an agreement between the city of Manchester, NH Department of Environmental Services, and the US Environmental Protection Agency to correct the sewer/stormwater overflow problem.

7 ponds in Manchester are being evaluated and monitored for restoration potential.

What are the Goals of the Program?

Goal: Return the ponds to their historical uses:

Objectives:

1. Promote public awareness, education, and stewardship.

2. Reduce pollutant load/nutrient inputs to improve water quality.

3. Maintain or enhance biological diversity.

4. Provide better recreational uses at the ponds.

3.
Pond Goals & Project Prioritization

How Do We Proceed?!

The Statistics:

- 7 Ponds! Many Issues!
- 3 Inlets, 6 Outlets
- Other unnamed/seasonal tributaries
- 1 Staff Person (Planning Department)
- 5 Years (2000-2005)
- $ 1 Million

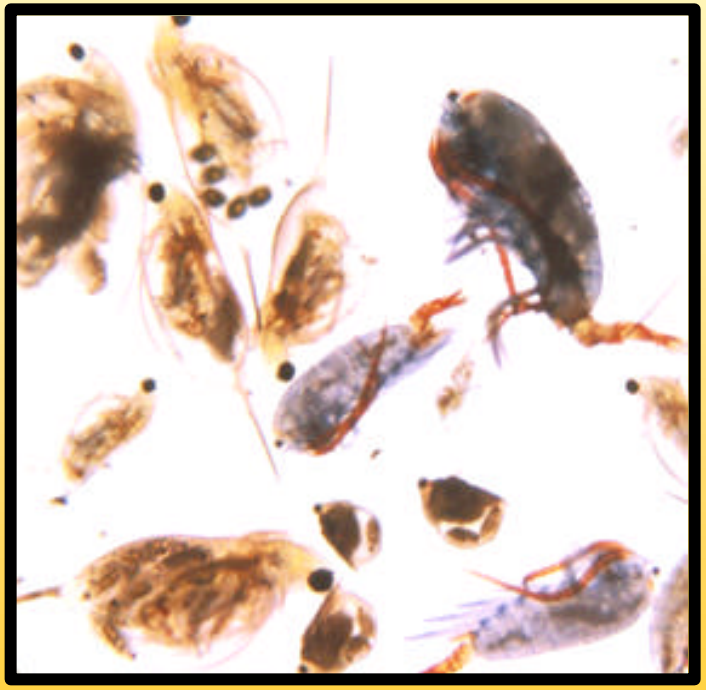
1st Year (2000)
Point & Nonpoint Source
Shoreline Surveys

- **Delineated and walked boundaries of watershed.**
- **Mapped “hotspots”**
- **Traced inlets for upstream issues.**

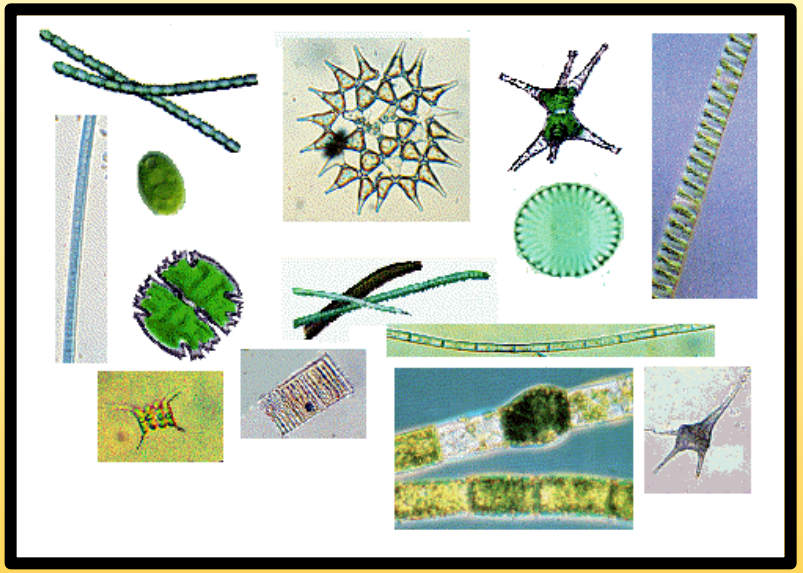
Every Year:
Baseline Water Quality Parameters

- Total Phosphorus
- Nitrogen
- Chlorophyll-a
- Turbidity
- Conductivity
- Dissolved Oxygen & Temperature Profile

Collection & Identification of Zooplankton & Phytoplankton



ZOOPLANKTON: Microscopic animal life that float within or on top of lake water.



PHYTOPLANKTON: Microscopic plant life that float within or on top of lake water.

2nd Year (2001) Shoreline & In-Lake Vegetation Surveys

What Vegetative Communities Are Present?

Are There Any Invasive Species?

3rd Year (2002)
Fish Surveys & Tissue Analysis

Are The Fish Safe To Eat?

3rd Year (2002)
Sediment Sampling & Analysis

Next:
Develop A Well-Defined Plan!

- 1 UPRP Staff, 7 Conservation Commissioners, 3 meetings.
- Defined Broad Goal(s) for each pond.
- Listed objectives to meet that goal including:
  1)Possible Water Quality Improvement projects
  2)Possible Outreach/Education Endeavors
  3)Possible Recreational Opportunities
  4)Possible Land Preservation Opportunities

The Result: A working document that prioritizes projects according to category, feasibility, and cost analysis

4.
Some Solutions

“Stormtreat” at Crystal Lake

6 sedimentation chambers & constructed wetland in a tank.

1. Stormwater → chambers. Larger solids removed.

2. Inside skimmers empty the upper portions of basins. More turbid waters left below.

3. Partially treated stormwater → into surrounding constructed wetland through a series of slotted pipes.

4. Wetland is of gravel substrate planted with bulrushes, etc.

5. Stormwater → subsurface of wetland & through root zone.

Pollution is filtered, adsorbed, and bio-chemically reacts

City Sewer Interceptor / Tie In – Crystal Lake & Pine Island Pond

- Crystal Lake – 2001
- Pine Island Pond – Fall 2003
- All homes / camps around lake.
- Decrease in bacteria levels & nutrient inputs.

Parking Lot Re-Construction & Drainage Improvement -Crystal Lake

Purpose: To improve the water quality through the installation of BMPs at two stormwater inlets. A combination of bank stabilization, grassed swales, infiltration galleries, and velocity-reducing structures will capture pollution, such as nutrients and bacteria, before entering the lake.

Grant Amount: $73,483.00
Local Match Amount: $50,668.00
Total Project Cost: $124,151.00

Parking Lot Improvements – Crystal Lake

Drainage Trench

Updated Parking Area

Parking Lot Improvements – Crystal Lake

Leaching Catch Basin

Drainage Swale

Vandalism

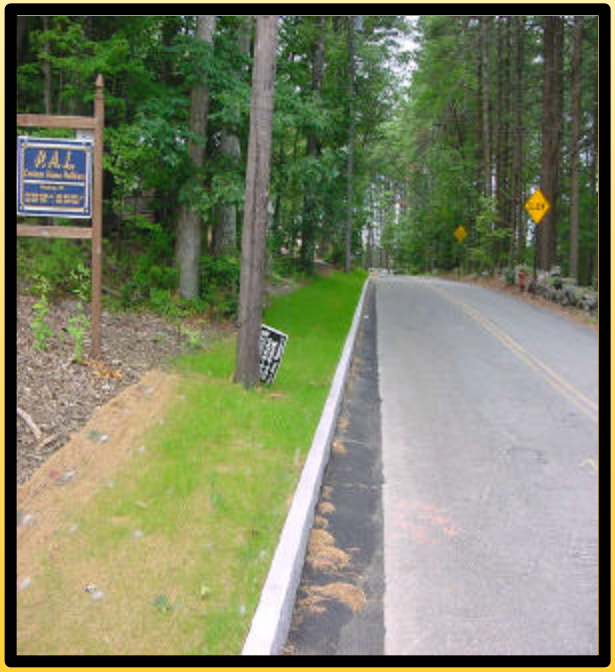
ATV / Bike Damage

Guard Rail

Corning Road Drainage Improvements – Crystal Lake

Installation of Granite Curbing

Bank Stabilization



Baffle Tank:

Area Paved, Loamed, Seeded

Phragmites Control – Crystal Lake

Area to be Dredged:

End of Parking Lot Drainage

Dredging

Phragmites Control – Crystal Lake

Dewatering Area

Dredged Area

Phragmites Control – Crystal Lake

“Downstream Defender” at Dorrs Pond

Separates solids from liquids by using fluid hydraulics

1. **Placement of inlet / outlet pipes direct flow in a pre-determined path**
2. **Stormwater introduced into the side, spirals around the perimeter, & oil and floatables rise to the water surface and are trapped**
3. **Flow continues to rotate & travels down toward the bottom**
4. **Sediment directed toward the center / bottom of the vessel and is collected**
5. **Center protects sediment & redirects the main flow upwards / inwards.**

By the time the flow reaches the top of the vessel, it is virtually free of solids and is discharged through the outlet pipe.

Tributary Work at Dorrs Pond

Purpose: To address nutrient loading and sedimentation in Dorrs Pond. Inlet II East collects large amounts of untreated runoff and is leading to the eutrophication of the pond. This project will install primary and secondary treatment measures in the inlet to greatly reduce the pollutant load reaching the pond. The treatment measures include a water quality inlet device and meandering grass swale.

Grant Amount: $48,321.00
Local Match Amount: $32,213.40
Total Project Cost: $80,534.40

Tributary Work – Dorrs Pond Site 1

Existing Headwall

Baffle Tank

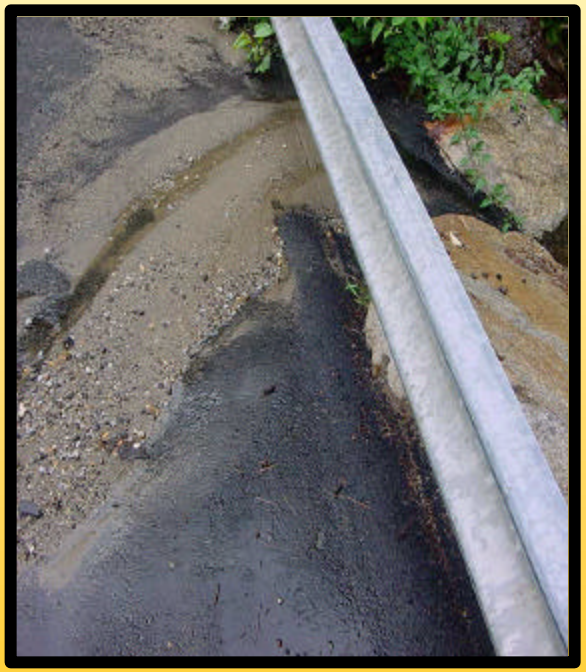
Completed Site

Tributary Work – Dorrs Pond Site 1

Erosion Control

Soil Over Headwall

Soil Over Headwall



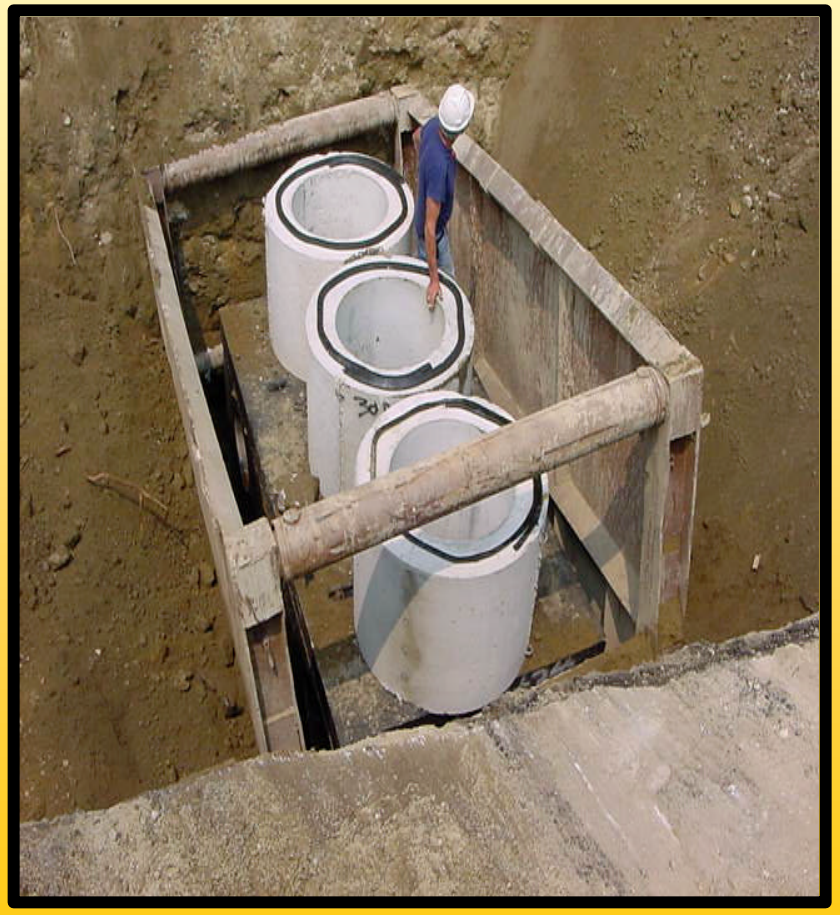
Tributary Work – Dorrs Pond Site 1

Curbing Installed

Tributary Work – Dorrs Pond Site 2

Trees Removed

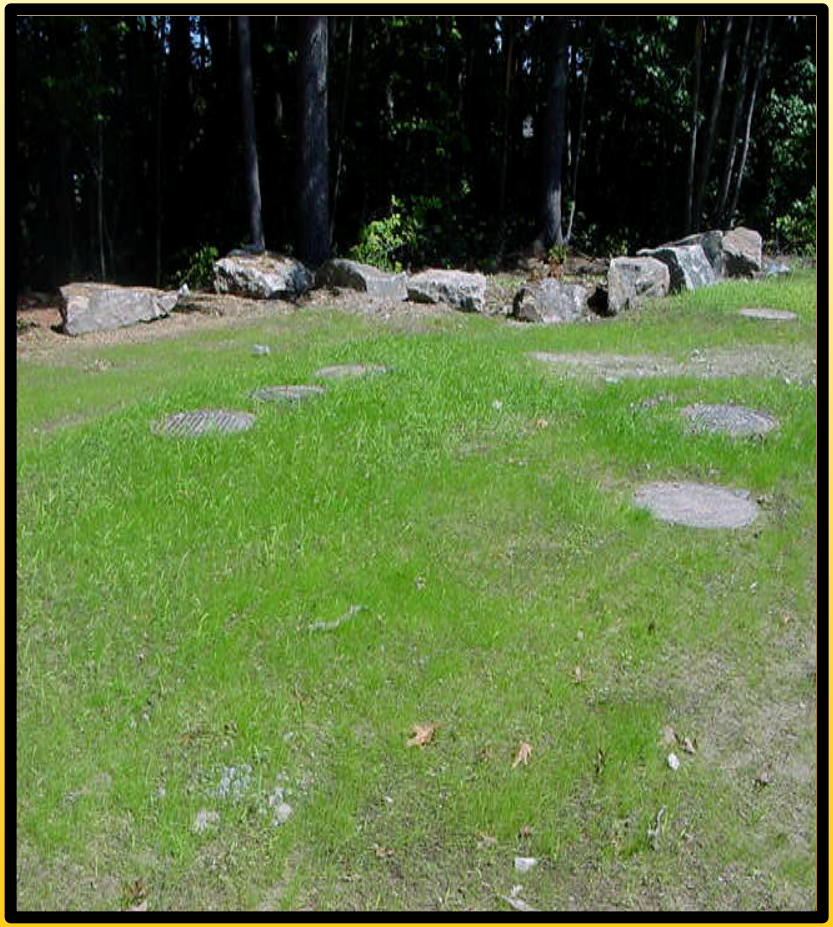
Baffle Tank Installed



Tributary Work – Dorrs Pond Site 2

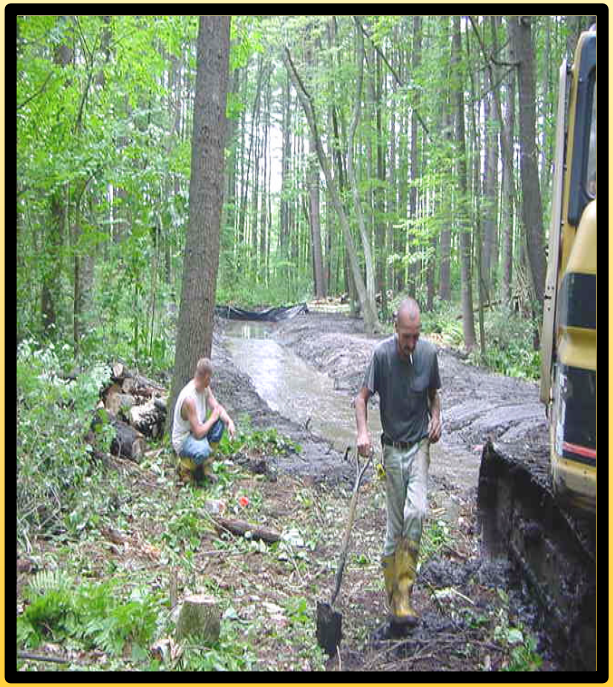
Granite & Arborvitaes

Vegetated Site



Tributary Work – Dorrs Pond Site 3

Brook Channeling



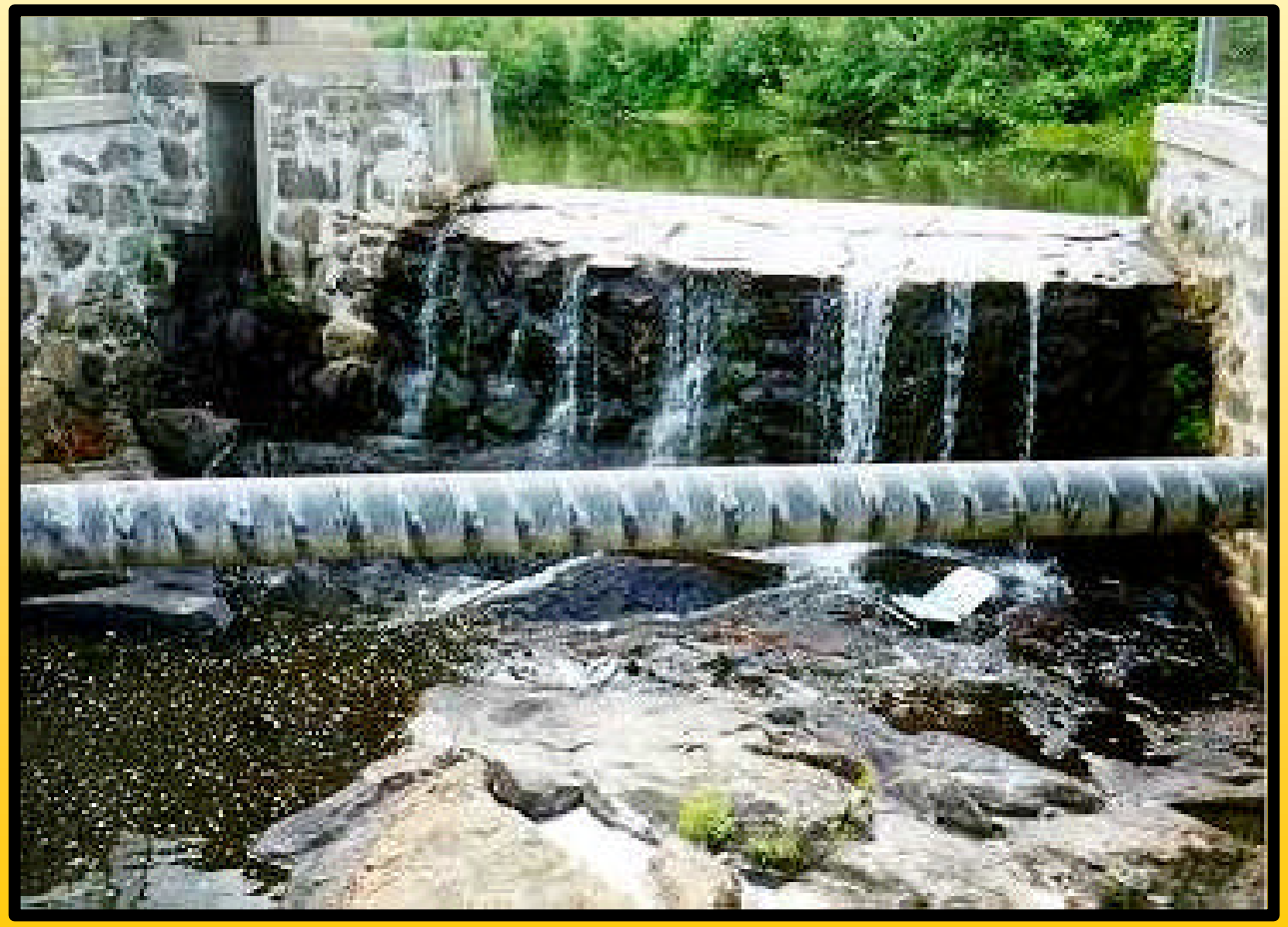
Bio Logs

Shoreline Stabilization – Dorrs Pond

Rehabilitation of Walkways/Loop Trail, & Parking Lot -Dorrs Pond

Rehabilitation of Boat Ramp & Playground -Dorrs Pond

Dam Removal Feasibility Study & Black Brook Corridor Restoration at Maxwell Pond

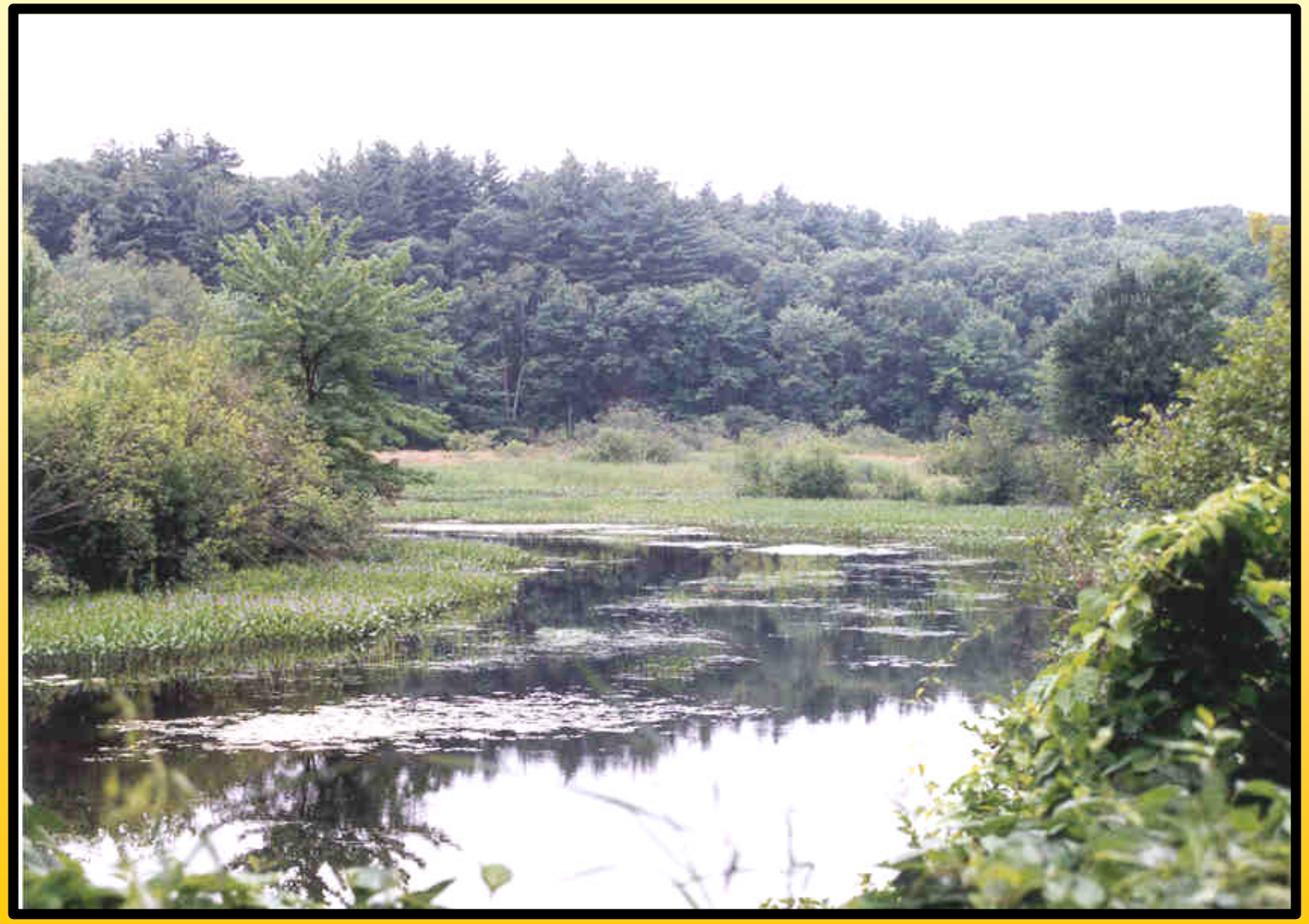


Dam Removal Study – Maxwell Pond

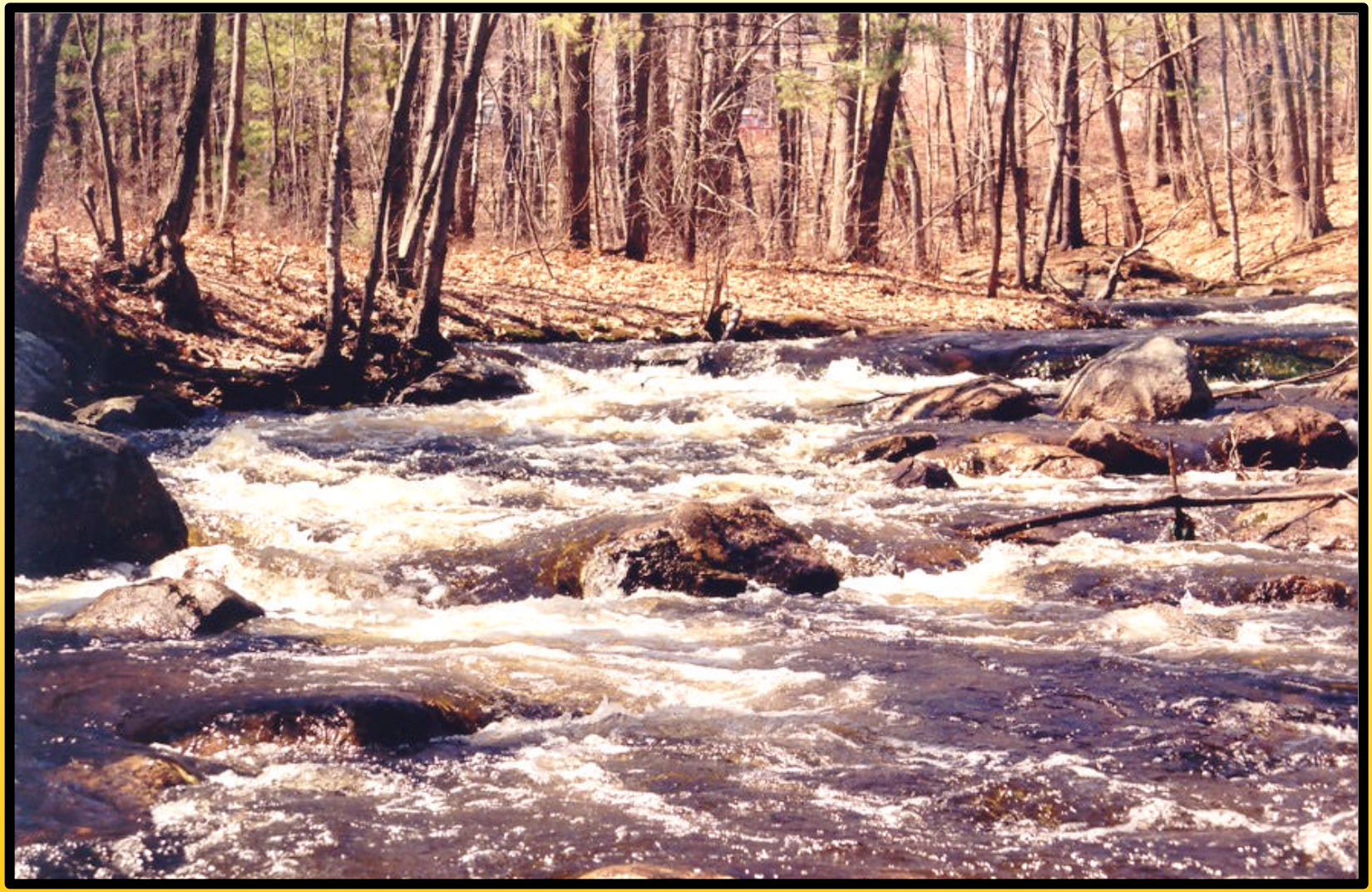
- **Dam impounded Black Brook in 1900 for ice harvesting.**
- **No longer serves historical purpose.**
- **Maxwell Pond no longer used for swimming / boating – increase in sediment & aquatic plants.**
- **Land around pond owned by City of Manchester.**
- **Dam costs city approximately $5,000 in maintenance, annually.**

If dam is removed, approximately 6 miles of free-flowing stream habitat & fish passage would be restored!

Maxwell Pond – Now A Wetland / Stream Channel



Black Brook – Upstream / Inlet



Nutrient Input Study At All Ponds

Rails-To-Trails Work at Nutts Pond

- In partnership with Queen City Trail Alliance
- Will connect South Willow Street with Downtown/Millyard
- Runs adjacent to the west side of Nutts Pond

Pollution Prevention On-Site Assessment Business Survey at Nutts Pond

- Storage tanks
- Solid waste / dumpster maintenance
- Floor drains
- Stormwater management
- Hazardous waste storage
- Cleaning products
- Used oil
- Parts washing / absorbents
- Lead-acid batteries
- Antifreeze
- Vehicle washing, etc.

Businesses will be visited & surveys will be completed during the Summer of 2003

Businesses which are visited will receive BMP materials in appropriate areas

Follow up visits may be held to gain specific measurements

Chloride Reduction Feasibility Study at Stevens Pond

Chloride & sodium levels are among the highest ever recorded in a freshwater body in New Hampshire!

Task 1. Delineate Drainage Areas –using topo & storm drain maps

Task 2. Calculate Land Areas Receiving Salt Applications -1) roadway maintained by DOT 2) roadway maintained by the City of Manchester 3) private roadways 4) residential properties 5) commercial properties.

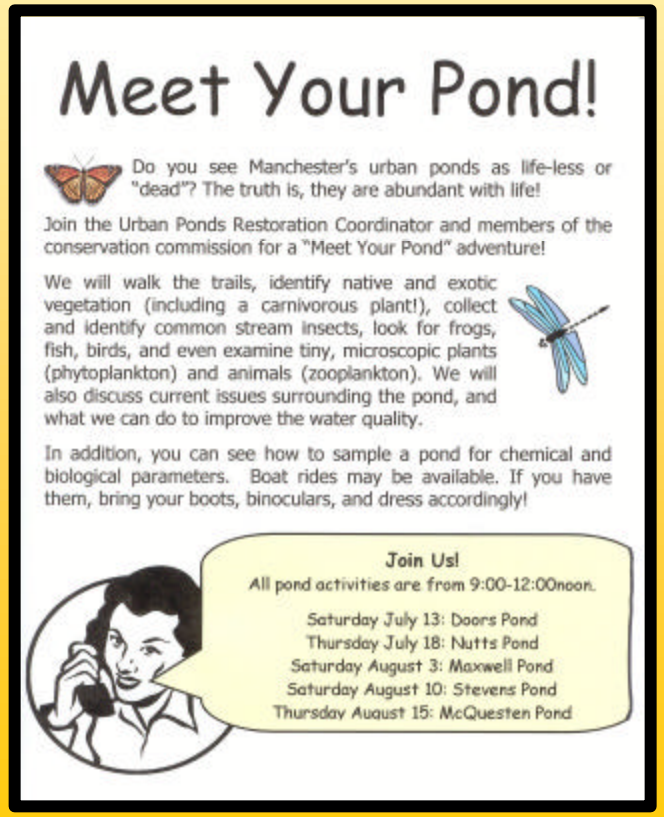
Task 3. Calculate Annual Salt Loadings to the Pond for Each Category and Each Subwatershed

Task 5. Prepare a Letter Report –Summarizing findings & making recommendations.

5.
Outreach / Education Endeavors

Presentations & Events

- **Classroom Presentations (Middle School, High School, Community Colleges)**
- **Other Presentations: NHDES, NHLA**



Meet Your Pond!

Do you see Manchester's urban ponds as life-less or "dead"? The truth is, they are abundant with life!

Join the Urban Ponds Restoration Coordinator and members of the conservation commission for a "Meet Your Pond" adventure!

We will walk the trails, identify native and exotic vegetation (including a carnivorous plant!), collect and identify common stream insects, look for frogs, fish, birds, and even examine tiny, microscopic plants (phytoplankton) and animals (zooplankton). We will also discuss current issues surrounding the pond, and what we can do to improve the water quality.

In addition, you can see how to sample a pond for chemical and biological parameters. Boat rides may be available. If you have them, bring your boots, binoculars, and dress accordingly!

Join Us!

All pond activities are from 9:00-12:00noon.

Saturday July 13: Doors Pond
Thursday July 18: Nutts Pond
Saturday August 3: Maxwell Pond
Saturday August 10: Stevens Pond
Thursday August 15: McQuesten Pond

SECOND ANNUAL MANCHESTER EARTH AND PONDS FESTIVAL

Date: Saturday 6/22/02 Time: 10 AM - 3 PM
Livingston Park, D.W. Highway, Manchester

Join us for an outdoor family festival designed to raise awareness of Manchester's environment!

Highlights Include:

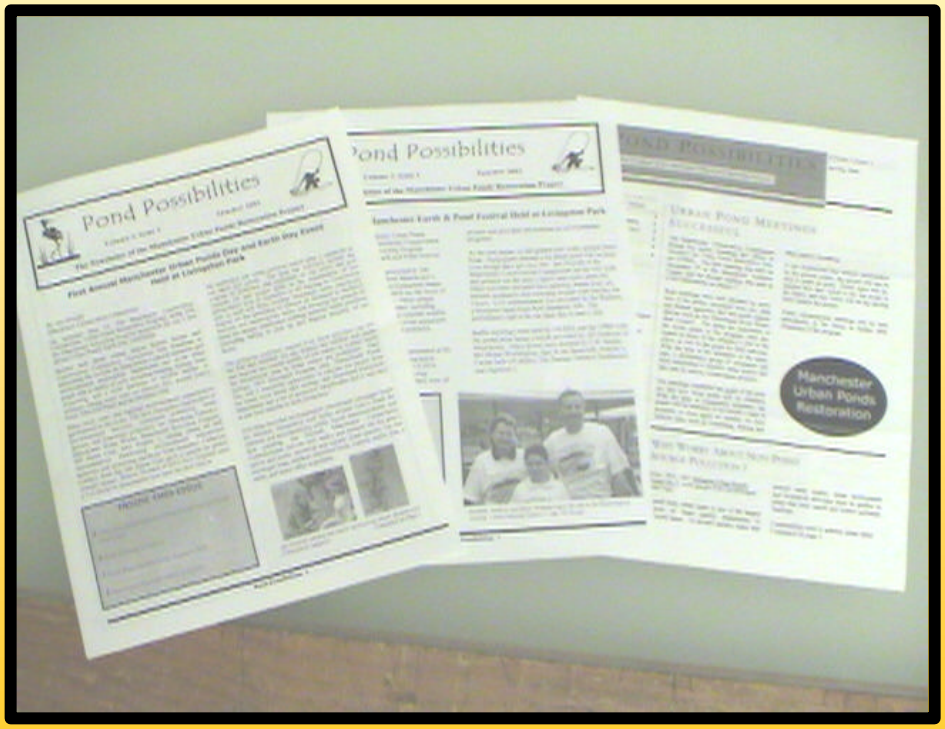
- Environmental exhibitors
- Kids activities
  - face painting
  - games, clowns
- Raffle prizes
- Kayak demonstrations
- Interpretive trail walks
- Live entertainment

This Event Is Sponsored By:
Manchester Urban Ponds Restoration Program
Manchester Recycling Committee
Manchester Conservation Commission

Newsletters & Newspapers

300 Copies of "Pond Possibilities"

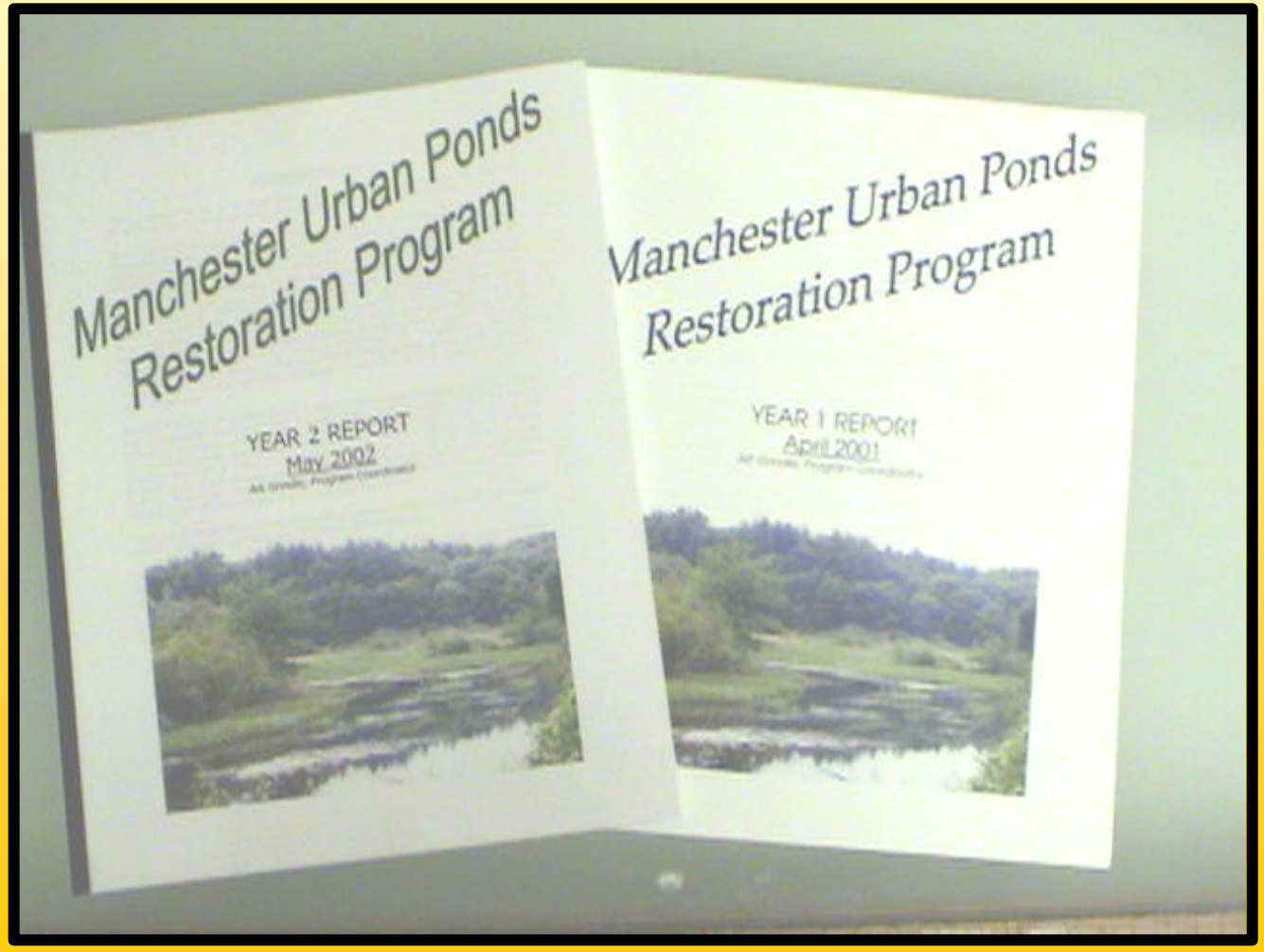
Produced and Distributed Bi-Annually



Editorials / Commentaries in Local Newspapers

Annual Reports

60 Copies Distributed Yearly



Traveling Display

City Hall, Workshops, Conferences, Libraries, Schools

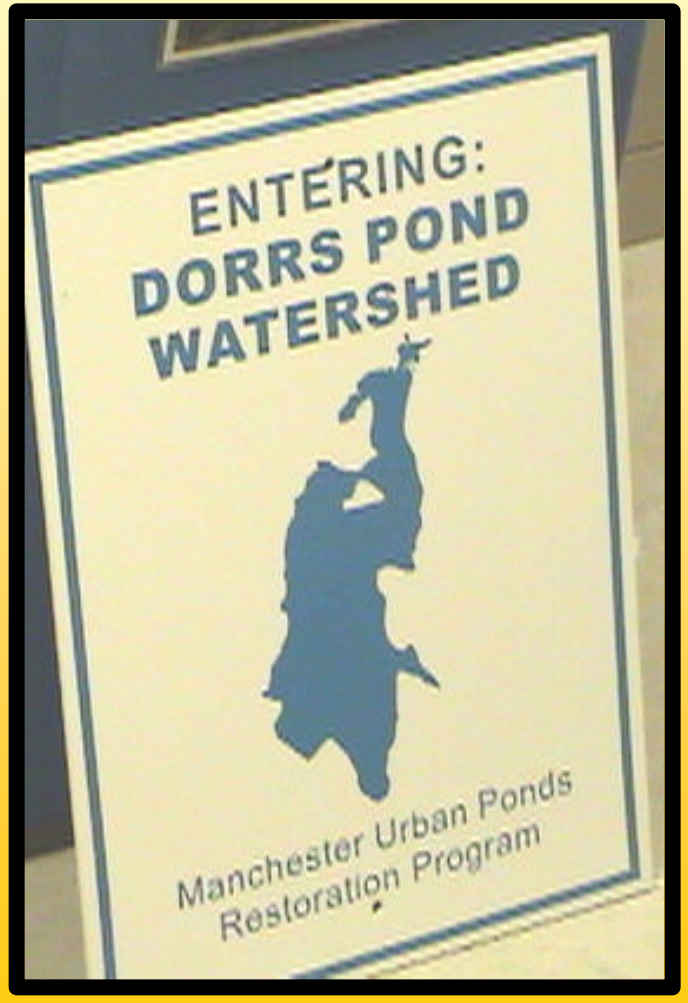
Creation & Retrofit of Kiosks

- **Constructed 3 Kiosks** **(Maxwell Pond, McQuesten Pond, Stevens Pond)**
- **Retrofitted 3 Kiosks** **(Crystal Lake, Nutts Pond, Pine Island Pond)**

Fact-Sheets (For Kiosks & Events)

- Map of waterbody / watershed.
- Pond Facts.
- Water Quality Data.
- History of Waterbody.
- Common Exotic Plants.
- Common Fish.
- Nonpoint Source Pollution Issues.

Watershed Signs



Web Site!

www.manchesternh.gov/UrbanPonds

Community Involvement

- Bi-Annual Pond Clean-Ups
- Water Quality Monitoring Assistance
- Local Pond Preservation Societies
- Shoreline Surveys

Thank You!

Jen Drociak –

Manchester Conservation Commission

Urban Ponds Restoration Program

1 City Hall Plaza

Manchester, NH 03103

(603) 624-6450

urbanponds@yahoo.com

http://www.manchesternh.gov/UrbanPonds